AMENDMENTS TO CLAIMS

1. (currently amended) An apparatus for measuring an optical path length difference, which apparatus is provided with

- optical elements to guide light from a light source through a first path and a second path;

- an at least three-way coupler to combine light from the first and the second ~~path~~ paths with each other in at least three combinations with at least three mutually different added relative phase displacements;

- a detector arranged to measure interference intensities of the at least three combinations; and

- a calculation unit arranged to calculate ~~determine~~, from the measured intensities, a phase difference between the light from the first and second paths, wherein the calculation unit calculates the phase difference using a mathematical relation which includes the measured intensities and while eliminating an effect of a contrast between the light from the first and second paths.

2. (previously presented) An apparatus for measuring an optical path length difference comprising:

optical elements to guide light from a light source through a first path and a second path;

an at least three-way coupler to combine light from the first and the second paths with each other in at least three combinations with at least three mutually different added relative phase shifts ϕ_1, ϕ_2, ϕ_3;

a detector arranged to measure interference intensities I0, I1, I2 of the respective at least three combinations; and

a calculation unit arranged to determine, from the intensities, a phase difference between the light from the first and second paths while eliminating an effect of a contrast between the light from the first and second paths, wherein

$I0 = A(1+V \cos(\phi_1+360*D/\lambda)$

$I1 = A(1+V \cos(\phi_2+360*D/\lambda)$

$I2 = A(1+V \cos(\phi_3+360*D/\lambda)$,

where V represents the contrast, D a path length difference between the first and second paths which causes the phase difference, λ a wavelength of the light used and A a function of the average amplitude of the light from the first and second paths.

3. (previously presented) An apparatus according to claim 1, wherein the at least three-way coupler combines the light from the first and second paths with each other with three different added relative phase displacements, which pairwise differ virtually one hundred and twenty degrees.

4. (previously presented) An apparatus according to claim 1, wherein the at least three-way coupler comprises three mutually coupled wave guides.

5. (previously presented) An apparatus according to claim 1, provided with a path length controller in at least one of the first and second paths, wherein the calculation unit is coupled to a drive input of the path length controller, and wherein the path length controller controls the path length difference between the first and second paths based on the calculated phase difference.

6. (currently amended) A method for measuring an optical path length difference, which method comprises the steps of:

- guiding light from a light source through a first path and a second path;

- combining light from the first and the second paths in at least three combinations with at least three mutually different added relative phase displacements;

- measuring interference intensities of the at least three combinations;

- calculating a phase difference between the light from the first and second paths using a mathematical relation which includes the measured intensities and while eliminating an effect of a contrast between the light from the first and second paths; and

supplying the phase difference to a control system coupled to at least one of the first and second paths.

7. (currently amended) A computer program product with instructions to have a computer perform the following steps:

- sampling interference intensities of at least three combinations of light from first and second light paths, wherein the light in the three combinations is combined with at least three mutually different added relative phase displacements;

- calculating a phase difference between the light from the first and the second paths using a mathematical relation which includes the sampled intensities and while eliminating an effect of a contrast between the light from the first and second paths; and

supplying the phase difference to a control system coupled to at least one of the first and second paths.